CHBE470 Process Dynamics and Control

Fall 2020

Tuesday & Thursday, Pre-recorded lectures will be uploaded online via Canvas

Faculty

Dr. Marya Cokar, marya.cokar@rice.edu

Teaching Assistants

Mr. Ayush Agarwal, aa140@rice.edu

Office Hours

Dr. Marya Cokar, schedule via email, office hours will be held on zoom

TA Office Hours
Mr. Ayush Agarwal, schedule via email, office hours will be held on zoom

Weekly Recitation Sessions

Thursdays 3:30pm – 4:30 pm, via zoom. We will go through practice problems and answer student questions.

Course Description

Process dynamics and control is an important aspect of any chemical process, be it a traditional petrochemical plant, a biochemical drug manufacturing unit or a nanoparticle manufacturing facility. The need to remain at a desired operating condition for economical and safety reasons in the face of ubiquitous disturbances has led to the development of this subject. It is the goal of this course to introduce to students the dynamical nature of chemical process, importance of modeling processes, various aspects of a control system and the design a control system.

Course Prerequisites
ChBE 390, ChBE 402, and ChBE 412

Required Textbooks

"Process Dynamics and Control", 4th Edition, by Dale E. Seborg, Thomas F. Edgar, Duncan A. Mellichamp, Doyle, Francis J. III, ISBN 978-1-119-28591-5

Canvas

Please check the ChBE 470 Canvas Site regularly for announcements, lecture notes and videos, resources, and homework assignments. You are responsible for reading all the Canvas announcements in a timely fashion. Sign in with your NetID and password to http://www.rice.edu/canvas/

Homework Policy

Homework will be due at 6pm a week after it is assigned. It will be uploaded in Canvas.

Honor Code Policy

The exams will require the honor pledge. All exams will be take home.

Students are encouraged to discuss the homework sets with other students, the teaching assistants, the instructor, or anyone else. The assistance is limited to the discussion of the problem. Consulting another student's solution (even from a previous ChBE470 class) is prohibited and homework solutions may not be copied from any source.

Lecture Topics

- Dynamics of chemical processes
- Laplace transforms
- Transfer functions
- Analysis of process models
- Development of empirical models
- Feedback control
- Stability analysis of closed-loop systems
- Multivariable control
- Tuning of feedback controllers
- Introduction to advanced control strategies

Special Needs

If you have a documented disability that may affect academic performance, you should: 1) make sure this documentation is on file with Disability Support Services (Allen Center, Room 111 / adarice@rice.edu / x5841) to determine the accommodations you need; and 2) meet with me to discuss your accommodation needs during the first two weeks of class. All discussions will remain confidential.

Grading

The class will consist of 1 midterm exam, 1 final exam and 6 assignments one new assignment will involve laboratory experimentation. Grade distributions will be as follows:

Homework – 30%
Midterm Exam – 30%
Final Exam – 40%